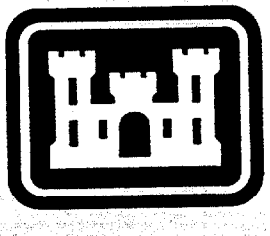
FINAL

WORK PLAN

RCRA FACILITY INVESTIGATION OF SOLID WASTE MANAGEMENT UNITs RSA-99,-117, and-130 REDSTONE ARSENAL HUNTSVILLE, ALABAMA

Prepared for:



U.S. ARMY CORPS OF ENGINEERS
Savannah District

Contract: DACA 21-91-D-0024

APRIL 1993

EBASCO ENVIRONMENTAL
A Division of Ebasco Services Incorporated

DELIVERY ORDER NO. 0011
UNDER
CONTRACT NO. DACA 21-91-D-0024

EBASCO SERVICES INCORPORATED

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REDSTONE ARSENAL
HUNTSVILLE, ALABAMA

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EBASCO SERVICES INCORPORATED

FINAL
WORK PLAN
RCRA FACILITY INVESTIGATION OF SWMU's RSA 99, 117 AND 130
ABANDONED PLATING SHOP
REDSTONE ARSENAL
HUNTSVILLE, ALABAMA

APRIL 1993

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SYMBOLS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Mangement
ADI	Acceptable Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
CAA	Clean Air Act
CAG	Carcinogen Assessment Group
CDQM	Chemical Data Quality Management
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CPF	Carcinogen Potency Factors
CWA	Clean Water Act
DERP	Defense Environmental Restoration Program
DOT	Department of Transportation
DQO	Data Quality Objective
FOL	Field Operations Leader
FS/CDAP	Field Sampling and Chemical Data Acquisition Plan
GC/MS	Gas Chromatography/Mass Spectrometry
HA	Health Advisories
HTW	Hazardous and Toxic Waste
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NWS	National Weather Service
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PCB	Polychlorinated Biphenyl
PM	Project Manager
POTW	Publically Owned Treatment Works
QA	Quality Assurance
QC	Quality Control
RAS	Routine Analytical Services
RCRA	Resource Conservation and Recovery Act
R&D	Research and Development
RfD	Reference Dose
RFI	RCRA Facility Investigation
RSA	Redstone Arsenal

SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SM	Site Manager
SSHP	Site Safety and Health Plan
TLV	Threshold Limit Value
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
WP	Work Plan

EXECUTIVE SUMMARY

This Work Plan was prepared for the U.S. Army Corps of Engineers (USACE), Savannah District, by Ebasco Environmental under Contract No. DACA 21-91-D-0024, Delivery Order No. 0011. The document describes all those activities associated with the investigation of soil and groundwater at RSA 99, 117, and 130 located within Redstone Arsenal, Huntsville, Alabama.

Investigative activities will be conducted at the three sites to characterize contaminants of concern and to obtain a preliminary definition of the extent of contamination. The investigations will consist of subsurface soil sampling, groundwater monitor well installation and sampling, and sludge sampling. After all field work and analyses have been performed and completed, a Site Investigation Report shall be prepared and submitted to USACE which presents all data, analyses, conclusions, and recommendations.

1.0 INTRODUCTION

This Work Plan describes Ebasco's approach to investigating soils and groundwater at Solid Waste Management Units RSA 99, 117 and 130 within Redstone Arsenal, Huntsville, Alabama. The Plan was prepared for the U.S. Army Corps of Engineers (USACE), Savannah District, under Contract No. DACA 21-91-D-0024, Delivery Order No. 0011. Development of the Plan was guided by the following:

- Chemical Data Quality Management for Hazardous Waste Remedial Activities, Department of the Army, USACE, October 1, 1990.
- Installation of Ground-Water Monitoring Wells and Exploratory Borings at Hazardous Waste Sites, USACE, Missouri River Division, May 1990.
- Minimum Chemistry Data Reporting Requirements for DERP and Superfund HTW Projects, USACE memorandum, August 1989.
- Guidance for Data Useability in Risk Assessment, USEPA, October 1990.
- Statement of Work for RCRA Facility Investigation of RSA 99, USACE, July 1992.
- Statement of Work for RCRA Facility Investigation of RSA 117, USACE, July 1992.
- Statement of Work for RCRA Facility Investigation of RSA 130, USACE, July 1992.

1.1 SOIL AND GROUNDWATER INVESTIGATION OBJECTIVES

Prior to this investigation, no contamination evaluation has been performed on the project sites. This soil and groundwater investigation is designed to determine if contamination has occurred

at the sites and, if so, provide a preliminary definition of the extent of that contamination. The following are general objectives to be achieved by the soil and groundwater testing investigation.

1) Identify and characterize the contaminants of concern.

2) Collect sufficient environmental, chemical, hydrogeological, and related analytical data to assess existing media contamination. Proposed field activities will focus on determining presence/absence of contamination and will make a preliminary attempt at defining extent of contamination.

3) Identify site conditions which may limit or promote the use of certain remedial technologies.

1.2 PROJECT OVERVIEW

Redstone Arsenal (RSA) is a U.S. Army facility located in Madison County, Alabama. The project area RSA 99 is located at Thiokol, Building 7614, in the southeast section of the North Plant. The project area RSA 130 is located in the east central portion of the Arsenal in the Thiokol North Plant northwest of the intersection of Redstone and Magazine Roads. The project area RSA 117 is located near the geographical center of the Arsenal, east of Industrial Road and south of Mills Road. The focus of this soil and groundwater investigation will be to determine presence/absence of contamination and obtain preliminary information on the extent of contamination.

The proposed investigation will consist of subsurface soil sampling, installation of groundwater monitor wells and groundwater sampling, and sludge sampling.

Laboratory analyses for RSA 99 will include Volatile Organic Compounds (VOCs), Semi-volatile Organics, Priority Pollutant Metals, Fluoride, and Cyanide. Laboratory analyses for RSA 130 will include VOCs, Semi-volatile Organics, Priority Pollutant Metals, Organochlorinated Pesticides, Bromide, Sulfate, and Nitrate. Laboratory analyses for RSA 117 will include VOCs,

Semi-volatile Organics, Priority Pollutant Metals, and Organochlorinated Pesticides. This will screen for any contaminants that may be present at each site. Based on resulting data, recommendations for further action will be made.

The proposed soil and groundwater testing is based on an approximate schedule of 7-months. A budget of approximately $115,219 has been estimated to perform the soil and groundwater testing at RSA 99. A budget of approximately $117,559 has been estimated to perform soil and groundwater testing at RSA 130. A budget of approximately $114,295 has been estimated to perform the soil and groundwater testing at RSA 117.

1.3 WORK PLAN OVERVIEW

This Work Plan is intended to be used in conjunction with three companion documents: the Site Safety and Health Plan, the Field Sampling and Chemical Data Acquisition Plan, and the Soil Boring and Monitor Well Installation Plan.

Section 2.0 of this document covers the site background and physical setting. It describes the site location and the history of the potentially contaminated areas. Other topics include current site conditions, physiography, geology, hydrology, and climate.

Section 3.0 provides a summary and evaluation of existing contamination data. It also addresses any previous response actions, contamination characterization, and contaminants of concern.

Section 4.0 includes a discussion of the site and outlines Applicable or Relevant and Appropriate Requirements (ARARs).

Section 5.0 addresses the Data Quality Objectives (DQO) and the type of data that will be obtained during the investigation. Further information on how the DQO will be achieved is presented in the Field Sampling and Chemical Data Acquisition Plan.

Section 6.0 details the four tasks of the soil and groundwater testing investigation. These tasks are: 1) Project Planning, 2) Field Investigation, 3) Sample Analysis and Data Validation, and 4) Site Investigation Report.

Section 7.0 is the Project Management Approach. This section covers the project organization, quality assurance, data management, and the analytical laboratory. Project schedule and budget estimates are included here.

2.0 SITE BACKGROUND AND PHYSICAL SETTING

2.1 SITE LOCATION

Redstone Arsenal is a U.S. Army facility located in Madison County, Alabama (Figure 2-1). RSA occupies approximately 38,300 acres. It is bounded on the north and east by the City of Huntsville, on the south by Wheeler National Wildlife Refuge and the Tennessee River, and on the west by agricultural, residential and light industrial areas (Figure 2-2).

RSA 99 is located at Thiokol, Building 7614, in the southeast section of the North Plant (Figure 2-3). RSA 99 is a single-story building and is approximately 30 feet long by 15 feet wide.

RSA 130 is located at Thiokol, Building 7614, in the southeast section of the North Plant northwest of the intersection of Redstone and Magazine Roads (Figure 2-4). RSA 130 is an inactive septic tank and drainfield area approximately one-quarter acre in size. Figure 2-4 shows the relationship of the site to nearby features.

RSA 117 is near the geographical center of the Arsenal, east of Industrial Road and south of Mills Road. The caustic plant formerly supported the Stauffer Chemical operations. The plant has been removed but foundations are still evident. The area is vegetated with grass and salt crystals are evident on the surface of the soil. The plant site is approximately 2 to 3 acres, with a discharge area of 2 to 3 acres. Figure 2-5 shows the relationship of the site to nearby features.

2.2 SITE HISTORY

2.2.1 Previous Studies

The building located on the RSA 99 site formerly contained plating tanks. The plating operation is reported not to have operated in the last 10 years. During operations, wastes were discharged to two sumps (one indoors and one outdoors). The outdoor sump, on the west side of the building, drained to the sanitary sewer. The indoor sump has no drain and was periodically pumped out.

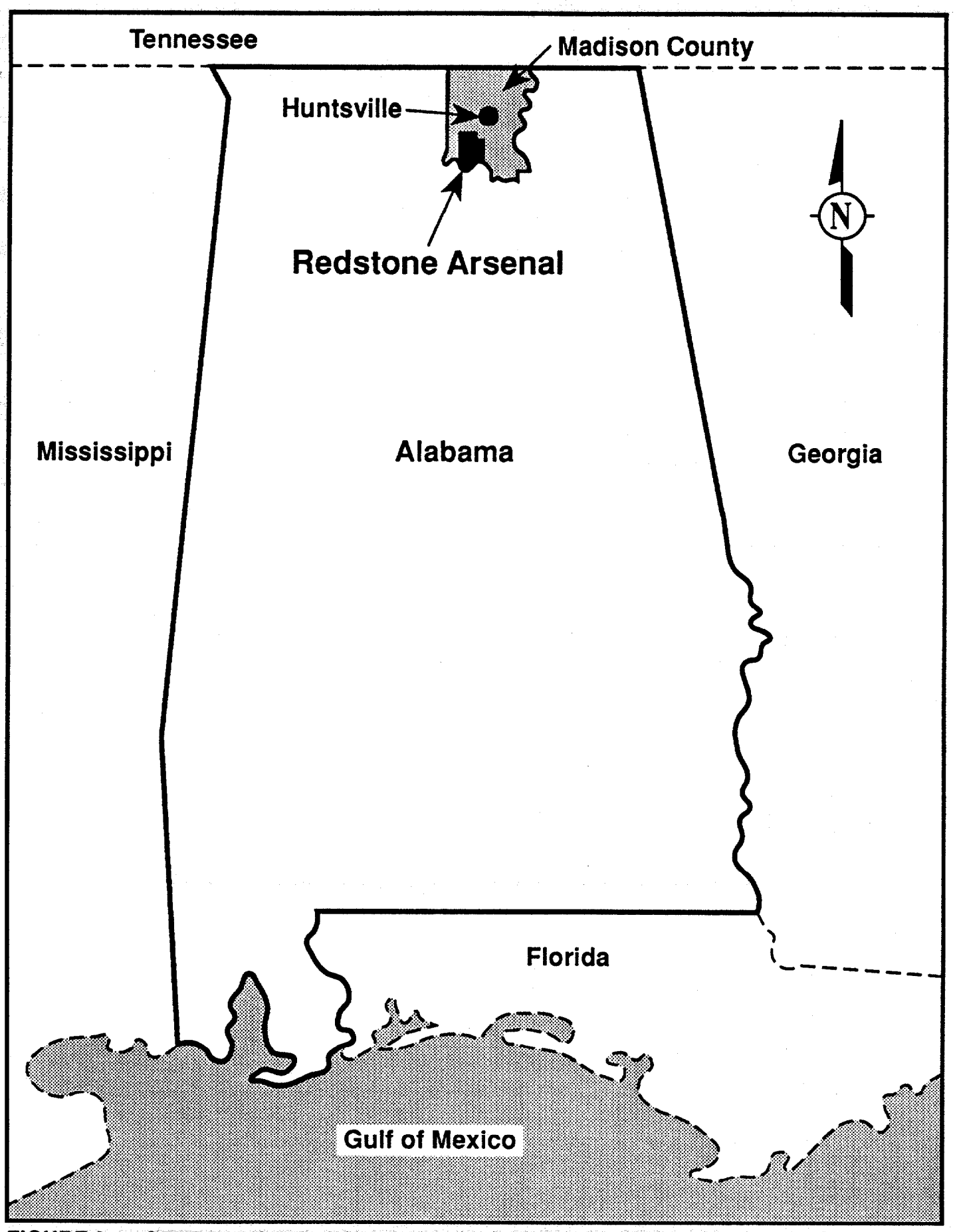


FIGURE 2-1 GENERAL SITE LOCATION MAP, REDSTONE ARSENAL

Source: P.E. Lamoreax & Associates, Inc., 1988

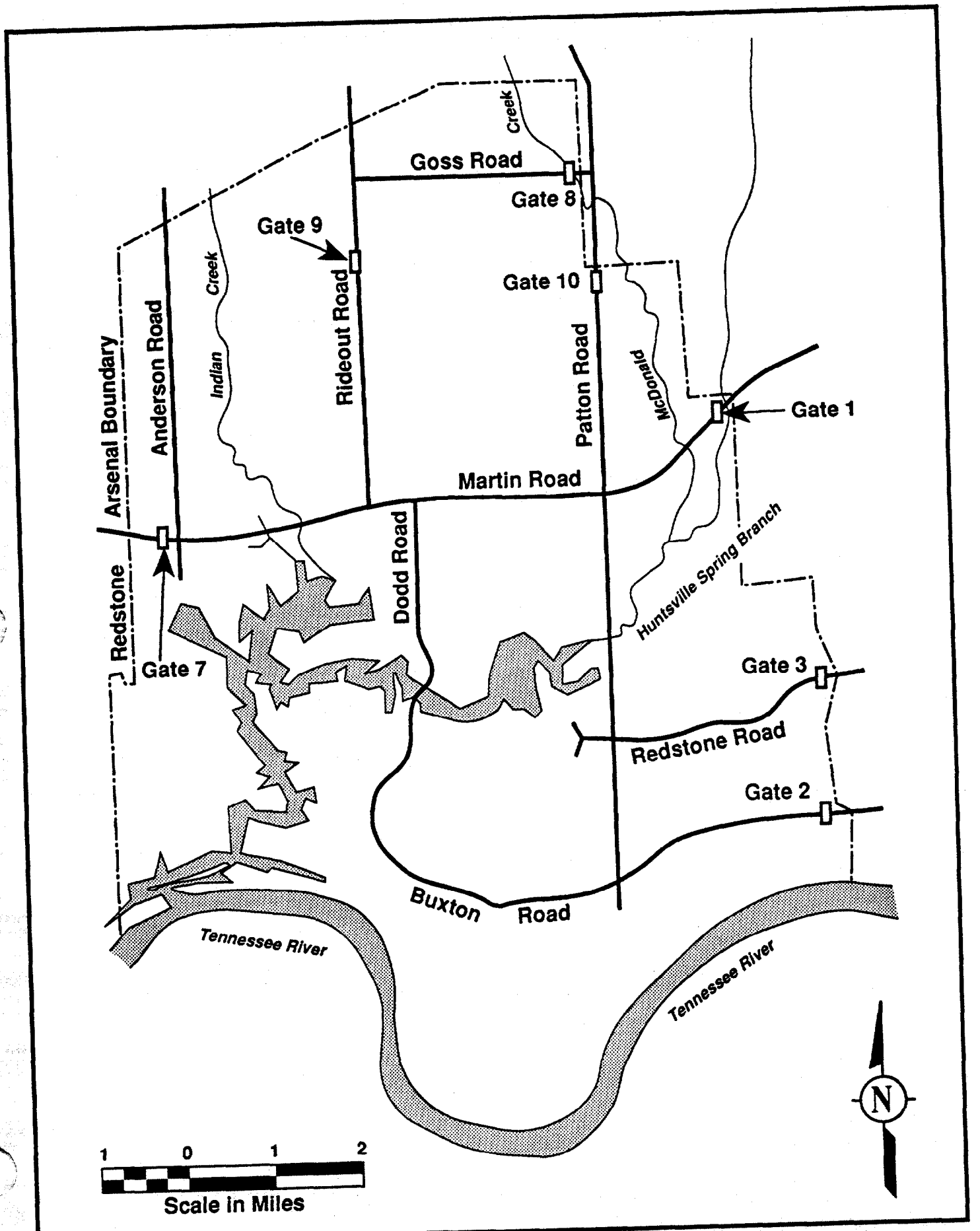
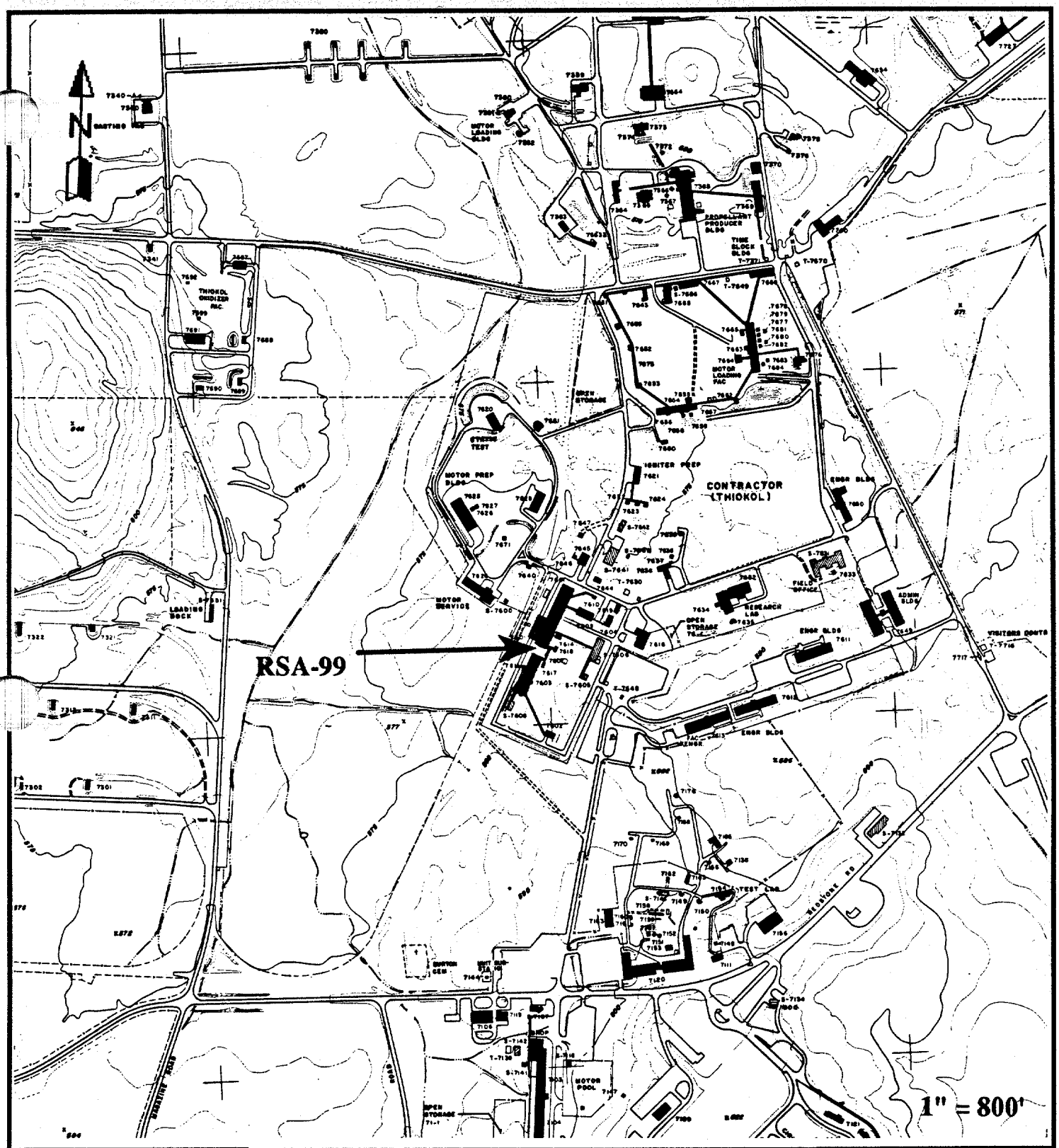


FIGURE 2-2 SITE MAP, REDSTONE ARSENAL, HUNTSVILLE, ALA.

Source: R.E. Lamoreax & Associates, Inc., 1988



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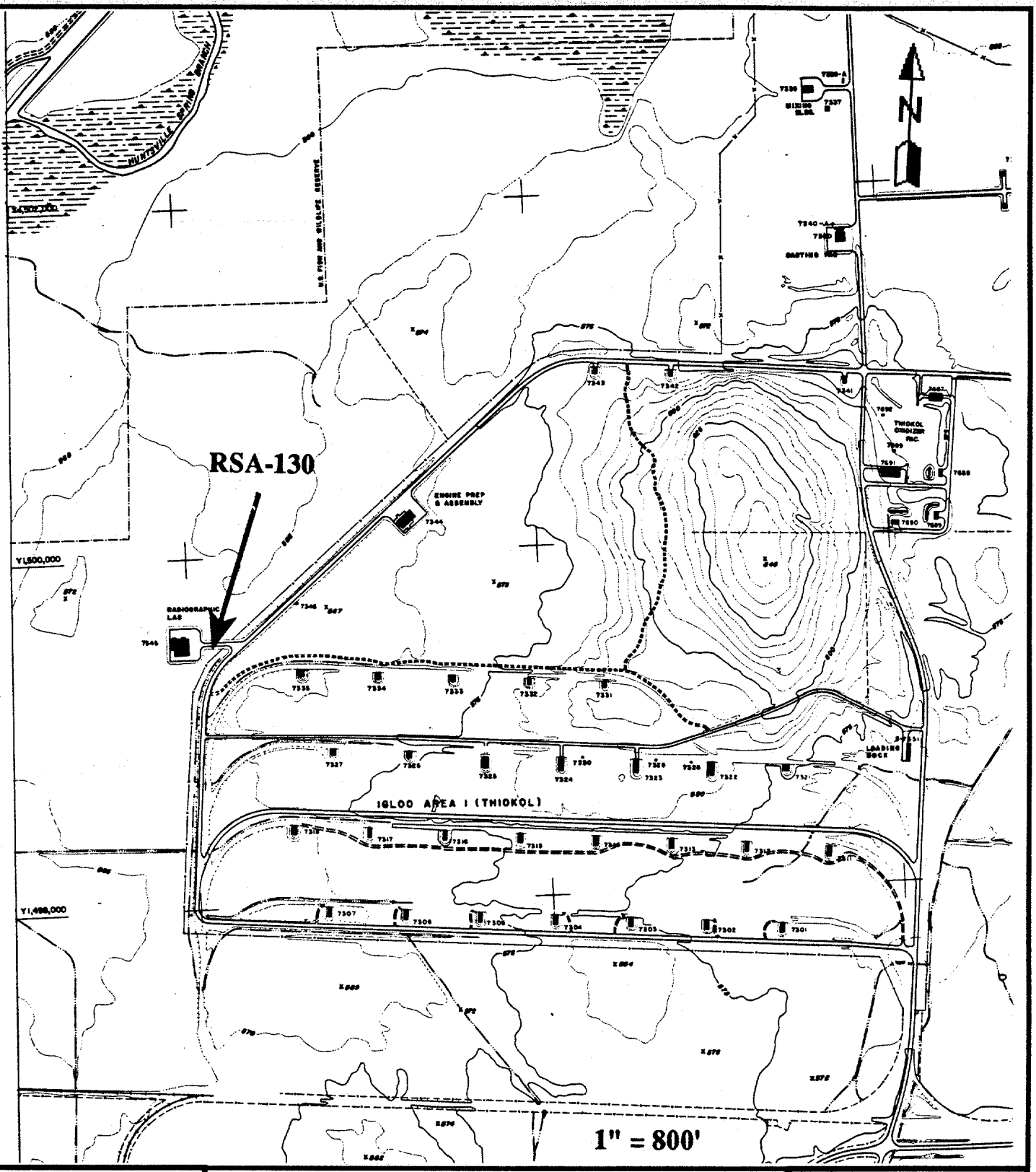
RSA-99 SITE LOCATION MAP
REDSTONE ARSENAL
HUNTSVILLE, ALABAMA

FIGURE 2-3



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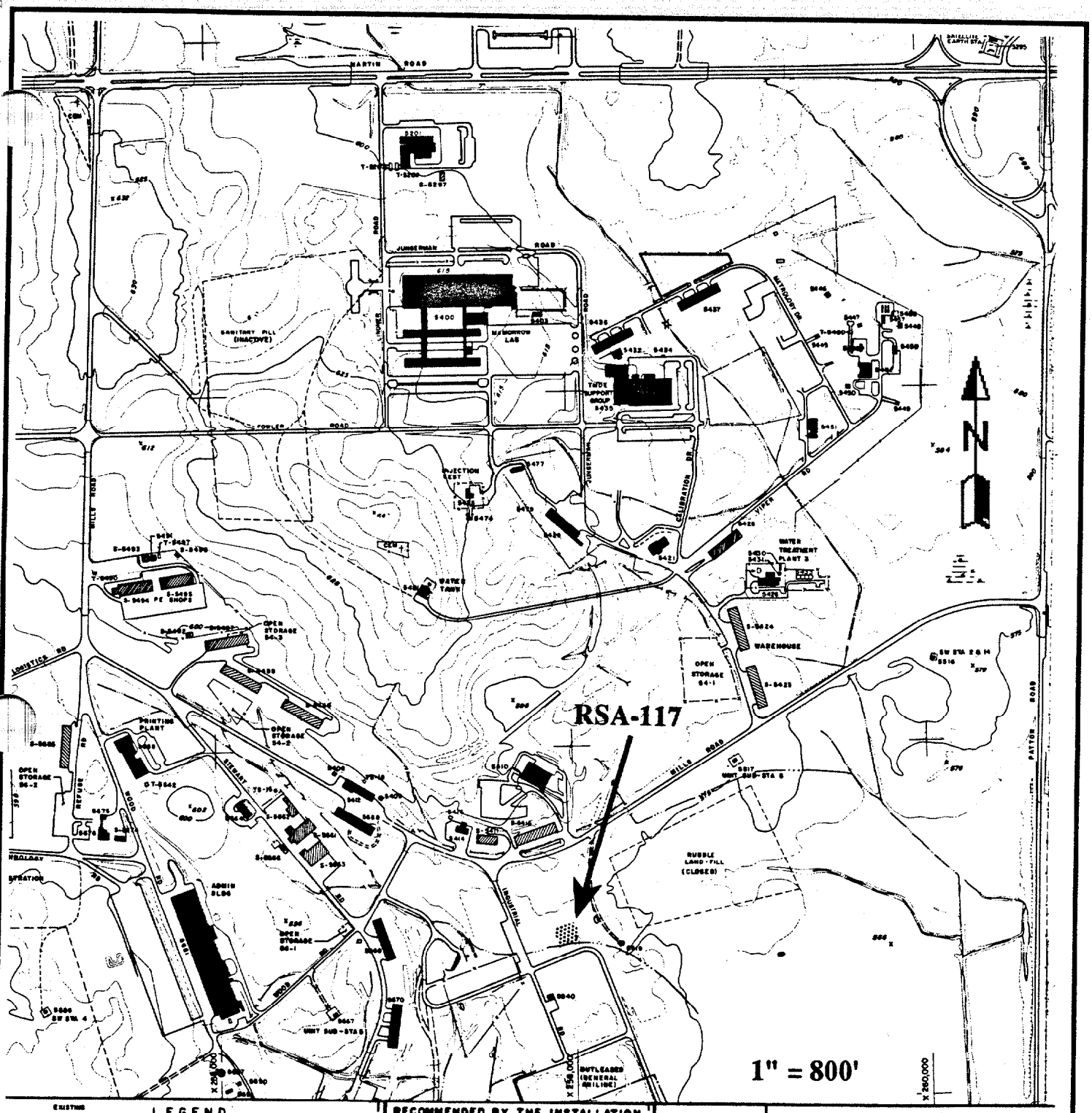
RSA-130 SITE LOCATION MAP REDSTONE ARSENAL HUNTSVILLE, ALABAMA

FIGURE 2-4



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RSA-117 SITE LOCATION MAP REDSTONE ARSENAL HUNTSVILLE, ALABAMA

FIGURE 2-5

RSA 130 is an inactive septic tank and drainfield area approximately one-quarter acre in size. The unit served as a septic tank for the adjacent radiographic lab. The septic tank received chemical washdown from film developing, including developer, fixers, and treatment solutions. Reportedly chlorinated solvents were not used. Available file information does not indicate that soil or groundwater sampling has been conducted at RSA 130.

RSA 117 (former caustic plant) was in operation in the 1940s and 1950s. Discharge from the former liquid caustic plant may have contained sodium hydroxide, sodium hypochlorite, and sodium chloride, as well as various metals.

The information in the remainder of this section has been extracted from a report by P.E. LaMoreaux and Associates dated July 1988.

2.3 PHYSIOGRAPHY

The boundary between the Cumberland Plateau section of the Appalachian Plateau physiographic province and the Highland Rim section of the Interior Low Plateau physiographic province is in central Madison County. RSA is within the Highland Rim province. The topography of RSA is gently rolling with a general slope from north to south toward the Tennessee River. Topographically, the highest areas are Weeden and Madkin Mountains which are erosional remnants of the Cumberland Plateau. Topographically low areas are valleys and flood plains of the Tennessee River and its tributaries.

2.4 GEOLOGY

A summary of geologic units, exposed in Madison County, is contained in Table 2-1. Bedrock formations range in age from Ordovician to Pennsylvanian. These strata have a very gentle regional dip of approximately 20 feet per mile toward the southeast. Therefore, younger formations are exposed in hills and highlands, and older formations are exposed in the lowlands. Regional structure is influenced by the Nashville Dome, the Appalachian Mountain system, and basement fracture patterns.

BEDROCK GEOLOGIC UNITS IN MADISON COUNTY, ALABAMA

PERIOD	FORMATION	LITHOLOGY AND OCCURRENCE	THICKNESS
Pennsylvanian	Pottsville Formation	Light gray and dark gray cross bedded sandstone, conglomeritic sandstone, and light gray, pale yellowish-brown and medium gray shale with thin beds of coal. Caps ridges in the eastern and south-central parts of the county.	≤200 feet
Mississippian	Bangor Limestone	Light to medium gray, massively bedded, fossiliferous limestone. Thin beds of grayish-green and moderate red shale and light gray dolomitic limestone occur in the upper part. Occurs at higher elevations southern, central, and eastern parts of the county.	400-500 feet
	Hartselle Sandstone	Light gray and very pale orange sandstone, cross bedded in part, interbedded with grayish-green and light gray fossiliferous shale and occasionally sandy, fossiliferous limestone. Restricted to higher elevations.	580 feet
	Pride Mountain Formation	Light greenish-gray and pale yellowish-brown fossiliferous shale with thin interbeds of clayey fossiliferous limestone. Mapped with the underlying Monteagle Limestone.	10-22 feet
	Monteagle Limestone	Light gray, fossiliferous, crystalline and oolitic limestone with thin interbeds of fossiliferous shale and minor amounts of chert. Occurs on hillsides and valley floors in the southern part of the county. Also exposed along the slopes of the higher hills in the central and eastern parts.	200-220 feet
	Tuscumbia Limestone	Light gray to light brownish-gray fossiliferous limestone containing chert lenses and nodules. Exposed in the southern half of the county and in the eastern hills.	Average 150 feet
	Fort Payne Chert	Very light gray to light gray fossiliferous limestone, siliceous and dolomitic limestone, and dolostone with thin beds of nodular chert. Exposed in lower elevations.	155-185 feet

TABLE 2-1

PERIOD	FORMATION	LITHOLOGY AND OCCURRENCE	THICKNESS
Devonian	Chattanooga Shale	Dark gray to black fossiliferous shale with a discontinuous sandstone at the base.	10 feet
Silurian	Brassfield Limestone	Medium to light gray, cherty, fossiliferous, partly glauconitic, dolomitic limestone, shale, and calcareous sandstone. Few outcrops along stream valleys in the northern third of the county.	10-40 feet
Ordovician	Sequatchie Formation	Moderate pink, moderate red, medium gray, and grayish-green fossiliferous limestone. Exposed only in stream valleys in the northern third of the county.	≤45 feet

The geologic units composing the bedrock beneath RSA are Mississippian in age. The Monteagle Limestone, Pride Mountain Formation, Hartselle Sandstone, and Bangor Limestone underlie the mountainous areas. The Tuscumbia Limestone underlies the area of this investigation.

The Tuscumbia Limestone has an average thickness of 150 feet and consists of gray, massive, fossiliferous limestone with chert layers. The limestone contains enlarged openings that have developed along joints, fractures, bedding planes, and faults. Dissolution of limestone has formed caves and cavities, which contributed to the formation of sinkholes and depressions in the land surface.

The Tuscumbia Limestone is successively underlain by the Fort Payne Chert, the Chattanooga Shale, and older geologic units. The Fort Payne Chert is 155 to 185 feet thick and consists of gray, cherty limestone. The Chattanooga Shale is about 10 feet thick and consists of dark gray to black shale. The top of the Chattanooga Shale is considered the base of the limestone aquifer that contains potable water.

Regional structure is influenced by the Nashville Dome (approximately north-south), the Appalachian Mountain System (approximately north 40° east), and basement fracture patterns (approximately north 70° west). Structure at RSA is evident in the form of lineaments reflecting fracture systems in the Tuscumbia Limestone which developed in response to the regional structure.

Bedrock in most of the area is overlain by a mantle of residual soil and alluvial sediment overburden. Residual soils, derived from the limestone, typically consist of sandy clay and of chert and limestone fragments in a clay matrix. Generally, chert and limestone fragments are more abundant near the top of the bedrock. However, chert may extend to land surface. significant deposits of alluvial and colluvial material (clays, silts, sands, and gravels) are confined to the lowlands.

2.5 HYDROGEOLOGY

Principal hydrogeologic units include the overburden, Tuscumbia Limestone, Fort Payne Chert, and Chattanooga Shale. The limestone aquifer is composed of the Tuscumbia Limestone and the Fort Payne Chert. Locally the overburden in part and the Chattanooga Shale areally are confining units for the limestone aquifer. Because of the confining units, water in the limestone aquifer occurs under artesian conditions in much of the area. The relationship between water-bearing units in the overburden and the artesian aquifers is not well defined and varies with location.

The overburden has developed as residuum from chemical and physical weathering of the Tuscumbia Limestone. Composition of the overburden is therefore directly dependent on the composition of the insoluble residue in the Tuscumbia Limestone. As a result, the overburden is composed primarily of chert-bearing sandy-clay derived from the weathering of the limestone. Discontinuous clayey-sand lenses have developed where the parent limestone has a significant fraction of sand. Chert layers, which become more common with depth, and chert pinnacles are remnants of chert zones in the bedrock which are characteristic of the Tuscumbia Limestone. The presence of chert layers and pinnacles in the overburden is due to the fact that chert is more resistant to weathering than the limestone.

Lithologic variability in the Tuscumbia Limestone causes the overburden to exhibit a considerable lateral and vertical variability which results in a complex hydrogeologic unit. As a total unit, the overburden serves as a confining layer for the underlying Tuscumbia Limestone aquifer system. Within the overburden, more permeable zones such as sand lenses and chert zones can be isolated or connected and contain groundwater under water-table, confined, or semi-confined conditions.

Water-bearing units in the overburden receive recharge from precipitation that percolates through soils to underlying saturated zones. Low hydraulic conductivities, typical of clay soils, result in low rates of horizontal and vertical movement of water through the overburden. Locally, however, recharge is more rapid and direct where permeable chert debris extends from the land

surface to bedrock. Water in the overburden is a source of recharge to the underlying limestone aquifer.

The lower part of the overburden, which contains abundant fragments of chert and limestone, is typically the most permeable zone. This zone is hydraulically connected with the top of bedrock.

Direction of groundwater flow in the overburden generally conforms with the slope of the land surface. Water in the overburden moves from higher to lower elevations toward streams and swampy areas where it is discharged as base flow to streams or lost through evapo-transpiration.

The limestone aquifer in the RSA area is the principal aquifer. In most areas, water in the limestone aquifer is confined by the overlying and underlying clay beds. Water in this aquifer is stored and transmitted through openings along bedding planes, fractures, and solution-enlarged openings which are more common in the upper 100 feet of the limestone.

Water in the limestone aquifer moves to lowland areas of the major stream basins where it is discharged as springs or base flow to the streams. The movement of water in the limestone aquifer is generally southward toward the Tennessee River. The direction of groundwater flow may be locally influenced by surface water bodies or pumpage.

2.6 CLIMATE

The climate of Redstone Arsenal is mild and temperate. Freezing temperatures seldom persist for more than 48 hours, and summer temperatures are not excessively high. The average annual temperature in Madison County is 62°F, the average summer temperature is 77°F, and the average winter temperature is 47°F.

The average annual snowfall is 3 inches and the average annual rainfall is 48 inches. Total monthly precipitation is usually highest in March (5.6 inches) and lowest in October (2.7 inches). The average growing season is 208 days. The last frost in the spring is typically no later than April 5 and the first frost in the fall is about October 31. Floods are common from

mid-December to mid-April; however, extensive floods are infrequent. Moderately dry conditions generally prevail throughout autumn. The amount of precipitation has been above normal for 1991 and 1992.

3.0 EVALUATION OF EXISTING CONTAMINATION DATA

3.1 EXISTING DATA SUMMARY

There are no data at present to begin to characterize the environmental conditions at RSA 99, 117, or 130.

3.2 PREVIOUS RESPONSE ACTIONS

There are no known response actions to date other than structural removal and general site clean up.

3.3 CONTAMINANTS OF CONCERN

The groups of compounds to be analyzed for at each site are:

- RSA 99 - VOCs, Semi-volatile Organics, Priority Pollutant Metals, Fluoride, and Cyanide.
- RSA 117 - VOCs, Semi-Volatile Organics, Priority Pollutant Metals, and Organochlorinated Pesticides.
- RSA 130 - VOCs, Semi-volatile Organics, Priority Pollutant Metals, Organochlorinated Pesticides, Bromide, Sulfate and Nitrate.

4.0 PRELIMINARY IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Section 121(d)(2)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), incorporates into law the CERCLA compliance policy. This policy specifies that Superfund remedial actions meet any federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). Also included is a provision requiring that state ARARs be met if they are more stringent than federal requirements only to the point where state ARARs are consistently enforced. The purpose of this requirement is to make CERCLA response actions consistent with other pertinent federal and state environmental requirements. Even though this may not be a Superfund project, ARARs are pertinent and are required under this contract by the USACE.

USEPA has indicated that site-specific ARARs must be identified for each site and that these will be considered during development of work plans, in public health and environmental risk assessment, during initial screening of technologies/development of alternatives, and during detailed evaluation of remedial alternatives.

Under SARA, an ARAR is defined as follows:

- Any standard, requirement, criterion, or limitation under federal environmental law.

- Any promulgated standard, requirement, criterion, or limitation under a state environmental or facility citing law that is more stringent than the associated federal standard, requirement, criterion, or limitation.

To properly consider ARARs and, more importantly, to clarify their function, the National Contingency Plan (NCP) defines two ARAR components. The NCP definitions have been revised to incorporate portions of SARA.

Applicable Requirements - Applicable requirements are those federal and state substantive requirements that would be legally applicable to the response action if that action were not taken pursuant to Section 104 and 160 of CERCLA. Requirements that are deemed applicable and would otherwise have jurisdiction in the given situation are considered applicable requirements.

Relevant and Appropriate Requirements - Relevant and appropriate requirements are those federal and state substantive requirements that, while not applicable, are designed to apply to problems sufficiently similar to those encountered at CERCLA sites so that their application would be appropriate. Relevant and appropriate requirements are intended to have the same weight and consideration as applicable requirements. The term "relevant" was included so that requirements which were initially screened as nonapplicable because of jurisdictional restrictions would be reconsidered and, if appropriate, included as relevant and appropriate requirements. A requirement may be relevant but not appropriate for the specific site. Only those requirements that are relevant and appropriate must be complied with.

ARARs that govern the extent of cleanup and existing features are used to develop remedial response objectives and alternatives.

ARARs can be classified into the following three categories:

- Chemical-specific - These ARARs govern the extent of site cleanup. Such ARARs may be actual concentration-based cleanup levels or they may provide the basis for calculating such levels. For example, groundwater and surface water criteria and standards may provide necessary cleanup goals for the RSA 99, 117 and 130 site remediations. Chemical-specific ARARs for this project are listed in Table 4-1.

- Location-specific - These ARARs are considered in view of natural or manmade site features. Examples of natural site features include wetlands, scenic rivers, and floodplains. Examples of manmade features include landfills, storage tanks, aquifer designations, and the presence of historic districts. Such ARARs can provide a basis for assessing existing site conditions and can later aid in assessing potential remedies. Location-specific ARARs are identified in Table 4-2.

TABLE 4-1

POTENTIAL CHEMICAL - SPECIFIC ARARs AND CRITERIA, ADVISORIES AND GUIDANCE

AUTHORITY	Media Affected	REQUIREMENTS	RATIONALE
Federal Requirement	Water	SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	MCLs have been promulgated for a number of organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking supplies. MCLs may also be considered relevant and appropriate for potential private drinking supplies.
Federal Requirement	Waste	RCRA - (40 CFR 261 and 264)	Identification of hazardous wastes
State Requirement	Water	Alabama Primary and Secondary Drinking Water Standards (ADEM ACR-335-7-2 and 3)	
Federal Requirement	Air	Clean Air Act - National Ambient Air Quality Standards (NAAQS) (40 CFR 50), and National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR 61)	NAAQS have been developed for seven pollutants and pertain to ambient concentrations. NESHAPS were developed to regulate emissions of toxic or hazardous air pollutants.
State Requirement	Air	(ADEM-ACR-335-3-11)	State has adopted Federal Regulations.
Criteria, Advisories, and Guidance	Water	Ambient Water Quality Criteria (AWQC)	AWQC have been developed to protect aquatic organisms and human health. Also AWQC can be used to characterize risk to aquatic organisms due to contaminant concentration in sediments.

TABLE 4-1 (con't)

POTENTIAL CHEMICAL - SPECIFIC ARARs AND CRITERIA, ADVISORIES AND GUIDANCE

AUTHORITY	Media Affected	REQUIREMENTS	RATIONALE
Criteria, Advisories, and Guidance	All	EPA Risk Reference Doses (RfDs)	EPA has developed RfDs to protect against noncarcinogenic effects from exposure to contaminants.
	All	EPA Carcinogen Assessment Group (CAG) Potency Factors	Carcinogen Potency Factors (CPF) have been developed by CAG to compute the incremental cancer risk from exposure to site contaminants.
	Water	EPA Health Advisories (HA) and Acceptable Daily Intakes (ADIs)	Used in assessing health risks from ingestion of contaminated water.
	Water	Federal Water Quality Documents for Pollutants	Guidance for protecting water quality.
	Water	SDWA - Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.11-141.16)	MCLGs are more stringent than MCLs and can be used when MCLs are found not to be protective of public health at a given site.

TABLE 4-2

POTENTIAL LOCATION - SPECIFIC ARARs AND CRITERIA, ADVISORIES AND GUIDANCE

AUTHORITY	Media Affected	REQUIREMENTS	RATIONALE
Federal Requirement	Water	Clean Water Act (CWA) (40 CFR 230) (33 CFR 320-330)	Requirement to prohibit the discharge of dredged or fill material into a wetland without a permit. No activity which adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available.
Federal Requirement	Waste	RCRA (4 CFR 264.18)	Location standards for RCRA facilities
Criteria, Advisories, and Guidance	Water	EPA's Groundwater Protection Strategy	Provides policy direction for EPA programs with groundwater responsibilities.

- Action-specific - These ARARs pertain to the implementation of a given remedy and can govern design, construction, and operation of the remedy. Examples of action-specific ARARs include monitoring requirements, effluent discharge limitations, hazardous waste transportation and handling requirements, OSHA worker safety requirements, and RCRA treatment facility requirements. Action-specific ARARs are shown in Table 4-3.

In addition to federal and state ARARs, military directives, guidance, and regulations may be pertinent to this particular site since it is a military installation. Potential military ARARs are provided in Table 4-4.

TABLE 4-3

POTENTIAL ACTION - SPECIFIC ARARs AND CRITERIA, ADVISORIES AND GUIDANCE

AUTHORITY	Media Affected	REQUIREMENTS	RATIONALE
Federal Requirement	Waste	RCRA General Facility Standards and Land Disposal Restrictions (40 CFR 262, 263, 264, and 268)	Facility Standards specify design, groundwater monitoring, closure and post-closure care for specific types of facilities. Land disposal restrictions exist for specified wastes without approved treatment.
State Requirement	Waste	ADEM-HWP-Chapter 14	Same as above.
Federal Requirement	Water	CWA (40 CFR 320 - 330)	Required to prohibit the discharge of dredge or fill material into a wetland without a permit. No activity which adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available.
	Water	CWA Pretreatment Regulations (40 CFR 1910)	Specifies pretreatment standards for discharges to Publicly Owned Treatment Works (POTW).
	Air	OSHA General Industry Standards (29 CFR 1910)	Specifies training requirement for workers at hazardous waste sites and 8-hour time-weighted average concentrations for certain compounds.
	N/A	OSHA Safety and Health Standards (29 CFR 1926)	Specifies the type of safety equipment and procedures to be followed during site remediation.
	N/A	OSHA Safety and Health Standards (29 CFR 1904)	Outlines the record keeping and reporting requirements for an employer under OSHA.

TABLE 4-3 (con't)

POTENTIAL ACTION - SPECIFIC ARARs AND CRITERIA, ADVISORIES AND GUIDANCE

AUTHORITY	Media Affected	REQUIREMENTS	RATIONALE
Federal Requirement	Air	CAA NAAQS for Total Suspended Particulates (40 CFR 129.105, 750)	Specifies maximum primary and secondary 24-hour concentrations for particulate matter.
	Water	CWA NPDES Program Requirements (40 CFR 122)	NPDES permitting requirements include discharge monitoring with records and compliance with water quality standards.
	Waste	DOT Rules of Transportation of Hazardous Wastes (49 CFR 107, 171-171.5)	Outlines procedures for packaging, labeling, manifesting, and transportation of hazardous materials.
State Requirement	Air	Control of Particulate Emissions, Fugitive Dust, and Fugitive Emissions (ADEM-ACR-335-3-4-.02)	Preventive precautions must be used to control particulate emissions.
	Water	General Pretreatment Standards and NPDES Rules (ADEM-WQP-335-6-5 and -6)	Indirect Discharge Permit and Pretreatment Rules and NPDES Rules may apply to any investigation-generated wastewater
	Waste	Provisions for Solid Waste Handling (ADEM-ACR-Chapter 13-1, -4)	The provisions may be applicable to past and present operations and closure of solid waste facilities.

TABLE 4-4

POTENTIAL MILITARY - SPECIFIC ARARs AND CRITERIA, ADVISORIES AND GUIDANCE

AUTHORITY	REQUIREMENTS	RATIONALE
Department of Defense	Solid and Hazardous Waste Management, DoD 4165.60 Directive	Military facilities must comply with solid and hazardous waste management requirements.
	Disposal of non-DoD Hazardous Materials on DoD Installations, Dod 6050.9 Directive	This may apply to operational aspects of the facility.
	Environmental Pollution, Prevention Control, Abatement DoD 4120.14 Directive	DoD must monitor and evaluate facility to ensure environmental standards are met.
	Facilities and Equipment Related to Scrap Metal, DoD 5126.15 Directive	This may apply to scrap metal associated with facility operations.
Technical Manuals	Chemical Agents and Hazardous Chemicals, TM 3-250	Applies to shipping, handling, storing, and disposing of hazardous chemicals, including solvents.
	Ground Maintenance and Land Management, TM 5-630	Applies to the operational aspects of the facility.
Criteria Advisories, and Guidance	Threshold Limit Value (TLV)	Issued as consensus standards for controlling air quality in the work place.

5.0 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are based on the concept that different data uses may require different quality data. Data quality is the degree of certainty with respect to precision, accuracy, reproducibility, completeness, and comparability of a data base. DQOs are qualitative and quantitative statements specifying the quality of data required to support soil and groundwater testing activities (including field screening and characterization) and to support remedial alternatives, evaluations, selection decisions, and enforcement. The four broad categories of data quality employed in the investigative process are described in the following paragraphs. Specifics regarding QA/QC, validation, and uses of each level of data are described in Data Quality Objectives for Remedial Response Activities (USEPA, 1987).

Level I - Field Screening. This level of data quality is the lowest but provides the most rapid results. It is used to assist in the optimization of sampling locations and for health and safety support. Generated data provide presence/absence of certain constituents and is generally qualitative rather than quantitative.

Level II - Field Analysis. This level of data quality is characterized by the use of analytical instruments that are carried in the field and by the use of mobile laboratories. Depending on factors such as instrumentation and environmental matrix, data may be either qualitative or quantitative.

Level III - Laboratory Analysis. This level of quality represents data generated under laboratory conditions using USEPA-approved procedures. This level of data is used for determination of source, extent, or characterization and to support evaluation of treatment technologies and treatability studies. These data are both qualitative and quantitative. This level of data can be used to perform a risk assessment.

Level IV. This quality level represents confirmational data characterized by rigorous quality control and validation procedures. Level IV data are appropriate to support critical decisions such as risk assessment, enforcement, and cost recovery documentation. Level IV data may be both qualitative and quantitative. Level IV data would be generated using protocols such as

CLP-RAS (Contract Laboratory Program-Routine Analytical Services) or equivalent protocols accepted by USEPA/USACE.

Tables 5-1, 5-2, and 5-3 list the data quality objectives for each of the media to be sampled at the RSA 99, 117, and 130 sites. In general, Level III data quality is proposed due to the preliminary nature of the investigation. The level and amount of laboratory documentation will be consistent with memoranda from the Missouri River Division Corps of Engineers dated August 16, 1989, and titled "Minimum Chemistry Data Reporting Requirements for DERP and Superfund HTW Projects".

TABLE 5-1

DATA QUALITY OBJECTIVES - SOIL SAMPLES
RSA 99, 117 and 130
HUNTSVILLE, ALABAMA

Medium:	Soil
Location:	RSA 99, 117, and 130
Data Types:	A. In Situ - OVA for Health and Safety B. Laboratory Analyses 1) RSA 99, VOCs, Semi-Volatiles, Priority Pollutant Metals, Fluoride, and Cyanide 2) RSA 117, VOCs, Semi-Volatiles, Organochlorinated Pesticides, and Priority Pollutant Metals 3) RSA 130, VOCs, Semi-Volatiles, Priority Pollutant Metals, Organichlorinated Pesticides, Bromide, Sulfate, and Nitrate
Sampling Types:	Subsurface soil samples will be collected during soil boring installation.
In Situ Analytical Data Level:	Level 1
Laboratory Analytical Data Level:	Level 3
Field Quality Control Samples:	10 percent duplicate samples
Background/control Sample:	Background soil samples will be collected and analyzed for each of the above parameters.
Field Quality Assurance Samples:	10 percent duplicate samples.

TABLE 5-2

DATA QUALITY OBJECTIVES - GROUNDWATER SAMPLES
RSA 99, 117 and 130
HUNTSVILLE, ALABAMA

Medium:	Water
Location:	RSA 99, 117, and 130
Data Types:	A. In Situ - pH, conductivity, temperature B. Laboratory Analyses 1) RSA 99, VOCs, Semi-Volatiles, Priority Pollutant Metals, Fluoride, and Cyanide 2) RSA 117, VOCs, Semi-Volatiles, Organochlorinated Pesticides, and Priority Pollutant Metals 3) RSA 130, VOCs, Semi-Volatiles, Priority Pollutant Metals, Organichlorinated Pesticides, Bromide, Sulfate, and Nitrate
Sampling Types:	Environmental, grab sample
In Situ Analytical Data Level:	Level 1
Laboratory Analytical Data Level:	Level 3
Field Quality Control Samples:	10 percent duplicate samples, 1 trip blank for each shipment of volatile organic samples and 1 field (equipment) blank for each week samples are collected.
Background/control Sample:	The proposed upgradient wells will be sampled and analyzed for all of the above parameters.
Field Quality Assurance Samples:	10 percent duplicate samples.

TABLE 5-3

DATA QUALITY OBJECTIVES - SLUDGE SAMPLE
RSA 130
HUNTSVILLE, ALABAMA

Medium:	Sludge
Location:	RSA 130
Data Types:	A. In Situ - OVA for Health and Safety B. Laboratory Analyses - VOCs, Semi-Volatiles, Priority Pollutant Metals, Organochlorinated Pesticides, Bromide, Sulfate, and Nitrate
Sampling Types:	A sludge sample will be collected from the inactive septic tank.
In Situ Analytical Data Level:	Level 1
Laboratory Analytical Data Level:	Level 3
Field Quality Control Samples:	10 percent duplicate samples
Background/control Sample:	Background soil samples will be collected and analyzed for each of the above parameters.
Field Quality Assurance Samples:	10 percent duplicate samples.

6.0 SOIL AND WATER INVESTIGATION

The four tasks to be completed during the course of the investigations at the RSA 99, 117, and 130 sites are listed below and described in the following subsections:

6.1 Project Planning
6.2 Field Investigation
6.3 Sample Analysis and Data Validation
6.4 Site Investigation Report

6.1 TASK 1 - PROJECT PLANNING

Project planning includes all preliminary activities to identify the scope of the investigation and prepare this Work Plan (WP); a Field Sampling and Chemical Data Acquisition Plan (FS/CDAP) which describes the procedures to ensure that chemical analytical data acquired during the investigation are of sufficient quality to meet the intended usage, and defines in detail the sampling and gathering methods to be used; and a Site Safety and Health Plan (SSHP) which describes the procedures used to ensure the health and safety of field personnel. All documents will be submitted to USACE, Savannah District, for review and will be modified to incorporate any comments and concerns. Upon final approval, these plans will serve as the established procedures and protocols for the soil and groundwater testing investigation.

6.2 TASK 2 - FIELD INVESTIGATION

Overall, the objectives of the field investigation for the RSA 99, 117 and 130 sites are to:

- Determine the chemical contaminant characteristics of the soil and groundwater at the sites;
- Determine if the study areas are negatively impacting the environment;
- Assess the nature and distribution of subsurface soil contamination at the sites;

- Make a preliminary assessment of the nature and distribution of groundwater contamination at the site; and

- Make a preliminary assessment of the overall soil, geologic, and hydrogeologic setting of the site.

The proposed sampling program includes a utilities location survey to identify subsurface utilities or obstructions prior to drilling and a water level survey to determine the direction of groundwater flow. The subsurface investigation will consist of soil borings and monitoring wells. Groundwater samples will be taken from the new wells.

6.2.1 Utilities Location

During field mobilization activities, Ebasco field personnel will accompany Redstone Arsenal and Thiokol personnel qualified to locate underground utilities. Drilling locations will be based on the location of underground utilities as identified by the utility locator and maps identifying underground utilities locations. The presence/absence and location of utilities will be determined at each site prior to subsurface drilling activities.

6.2.2 Water Level Survey

Water level measurements will be collected periodically during the soil and groundwater investigation. Initial water level measurements from the installed wells will be used to estimate the direction of groundwater flow. An arbitrary elevation datum will be established for each site.

6.2.3 Subsurface Soil Investigation

A total of four soil borings are proposed for each of the site areas. The exact placement of borings will be determined in the field based on the location of subsurface obstructions, utilities or access difficulties.

At RSA 99, one boring will be placed upgradient of the former plating shop and three will be placed in a downgradient location. At RSA 130, one boring will be placed upgradient of the inactive septic tank and drainfield and three will be placed in a downgradient location. At RSA 117, one boring will be placed upgradient of the former liquid caustic plant and three will be placed in downgradient locations. Background (upgradient) borings/wells will be located sufficiently upgradient from the individual sites and other potential nearby sites, to ensure a reasonable probability of sampling and testing for background conditions.

The soil borings described above will be completed to a depth of five feet below the seasonal low groundwater table. The borings will be advanced using hollow-stem augers with continuous split-spoon samples (2-foot intervals) collected beginning at the surface. A total of three samples will be collected for chemical analysis from each boring. These sample depths will be: near the ground surface, at an intermediate depth, and at the first sample interval collected below the water table. Two samples will be collected from the screened interval for physical testing. The subsurface lithology for each borehole will be visually logged by a site geologist based on the Unified Soil Classification System.

6.2.4 Groundwater Investigation

The proposed groundwater investigation consists of a monitoring well being completed in each of the soil borings described in the previous section by the procedure in Section 2.6 of the FS/CDAP. The exact placement of the wells in the field may vary slightly due to subsurface obstructions/utilities, access difficulties, or new information on the direction of groundwater flow. Each well will be sampled and the samples chemically analyzed. An in-situ permeability test will be performed on each well after sampling for chemical testing has been completed.

Each completed well will have an identification plate constructed of durable material permanently affixed. Each identification plate will include the following information: 1) drilling contractor name and registration number, 2) date the well was completed, 3) total depth of well, 4) a warning that the well is not for water supply and that the groundwater may contain hazardous materials, and 5) depths to well screen(s).

6.3 TASK 3 - SAMPLE ANALYSIS AND DATA VALIDATION

6.3.1 Sample Analysis

This section summarizes the number and type of samples to be collected and analyzed during the field investigation. Sludge, water and the selected subsurface soil samples will be submitted for laboratory analyses to Savannah Laboratories.

The analytical program has been designed to focus on the types of contaminants expected to be present at each site. A sampling and analysis summary for each site is presented in Table 6-1. Three samples will be collected for chemical analysis from each of the boreholes. Groundwater samples will be collected from the newly installed monitor wells. All samples will be analyzed for the parameters in Table 6-1.

In general, the analytical methods used will be USEPA SW-846 methods. Details on all methods are provided in the Field Sampling and Chemical Data Acquisition Plan, Section 3.1. Specific analytes and detection limits are listed in Appendix E of the Field Sampling and Chemical Data Acquisition Plan.

6.3.2 Data Validation

Validation of measurements is a systematic process of reviewing a body of data to provide assurance that the data are adequate for their intended use. The process includes the following activities:

- Auditing measurement system calibration and calibration verification;
- Auditing quality control activities;
- Screening data sets for outliers;
- Reviewing data for technical credibility and usability;
- Auditing field sample data records and chain-of-custody forms;
- Checking intermediate calculations; and
- Verifying the previous process.

TABLE 6-1

SUMMARY OF SAMPLES AND ANALYTICAL PROTOCOLS
HUNTSVILLE, ALABAMA

Sampling	Field Samples	Analysis	Protocol	Analytical Procedures	DQO Level
RSA 99 Soil	12	Volatile Organics	EPA SW-846	8240	III
	12	Semi-Volatile Organics	EPA SW-846	8270	III
	12	Priority Pollutant Metals	EPA SW-846	6010 7740/7421 7060/7471	III
	12	Fluoride	MCAWW	340.2	III
	12	Cyanide	EPA SW-846	9012	III
Water	4	Volatile Organics	EPA SW-846	8240	III
	4	Semi-Volatile Organics	EPA SW-846	8270	III
	4	Priority Pollutant Metals	EPA SW-846	6010/7470 7740/7421 7060	III
	4	Fluoride	MCAWW	340.2	III
	4	Cyanide	EPA SW-846	9012	III

TABLE 6-1 (Continued)
SUMMARY OF SAMPLES AND ANALYTICAL PROTOCOLS
HUNTSVILLE, ALABAMA

Sampling	Field Samples	Analysis	Protocol	Analytical Procedures	DQO Level
RSA 130 Soil	12	Volatile Organics	EPA SW-846	8240	III
	12	Semi-Volatile Organics	EPA SW-846	8270	III
	12	Priority Pollutant Metals	EPA SW-846	6010/7470 7740/7421 7060/7471	III
	12	Organochlorinated Pesticides	ERA SW-846	8080	III
	12	Bromide	EPA SW-846	300.0	III
	12	Sulfate	EPA SW-846	375.2/9035	III
	12	Nitrate	MCAWW	353.2	III
Water	4	Volatile Organics	EPA SW-846	8240	III
	4	Semi-Volatile Organics	EPA SW-846	8270	III
	4	Priority Pollutant Metals	EPA SW-846	6010/7470 7740/7421 7060/7471	III
	4	Organochlorinated Pesticides	EPA SW-846	8080	III
	4	Bromide	EPA SW-846	300.0	III
	4	Sulfate	EPA SW-846	9035	III
	4	Nitrate	MCAWW	353.2	III
Sludge	1	Volatile Organics	EPA SW-846	8240	III
	1	Semi-Volatile Organics	EPA SW-846	8270	III
	1	Priority Pollutant Metals	EPA SW-846	6010/7470 7740/7421 7060/7471	III
	1	Organochlorinated Pesticides	EPA SW-846	8080	III
	1	Bromide	EPA SW-846	300.0	III
	1	Sulfate	EPA SW-846	9035	III
	1	Nitrate	MCAWW	353.2	III

TABLE 6-1 (Continued)
SUMMARY OF SAMPLES AND ANALYTICAL PROTOCOLS
HUNTSVILLE, ALABAMA

Sampling	Field Samples	Analysis	Protocol	Analytical Procedures	DQO Level
RSA 117 Soil	12	Volatile Organics	EPA SW-846	8240	III
	12	Semi-Volatile Organics	EPA SW-846	8270	III
	12	Priority Pollutant Metals	EPA SW-846	6010/7470 7740/7421 7060/7471	III
	12	Organochlorinated Pesticides	EPA SW-846	8080	III
Water	4	Volatile Organics	EPA SW-846	8240	III
	4	Semi-Volatile Organics	EPA SW-846	8270	III
	4	Priority Pollutant Metals	EPA SW-846	6010/7470 7740/7421 7060/7471	III
	4	Organochlorinated Pesticides	EPA SW-846	8080	III

Validation of analytical data will be conducted by the laboratory and evaluated by the Ebasco Laboratory Coordinator. See Section 3.6 of the Field Sampling and Chemical Data Acquisition Plan for further details.

6.4 TASK 4 - SITE INVESTIGATION REPORT

After all field work and analyses have been performed and completed, Ebasco shall prepare and submit a site investigation report which shall include, but not be limited to, the following:

1) Site description and location
2) Physiography
3) Hydrology
4) Geology and hydrogeology
5) Ownership and prior use
6) Individual site location/description and potentially contaminated areas
7) Documentation of site investigation
8) Analytical results
9) Conclusions
10) Recommendations
11) References
12) Necessary appendices

7.0 PROJECT MANAGEMENT APPROACH

7.1 ORGANIZATION AND APPROACH

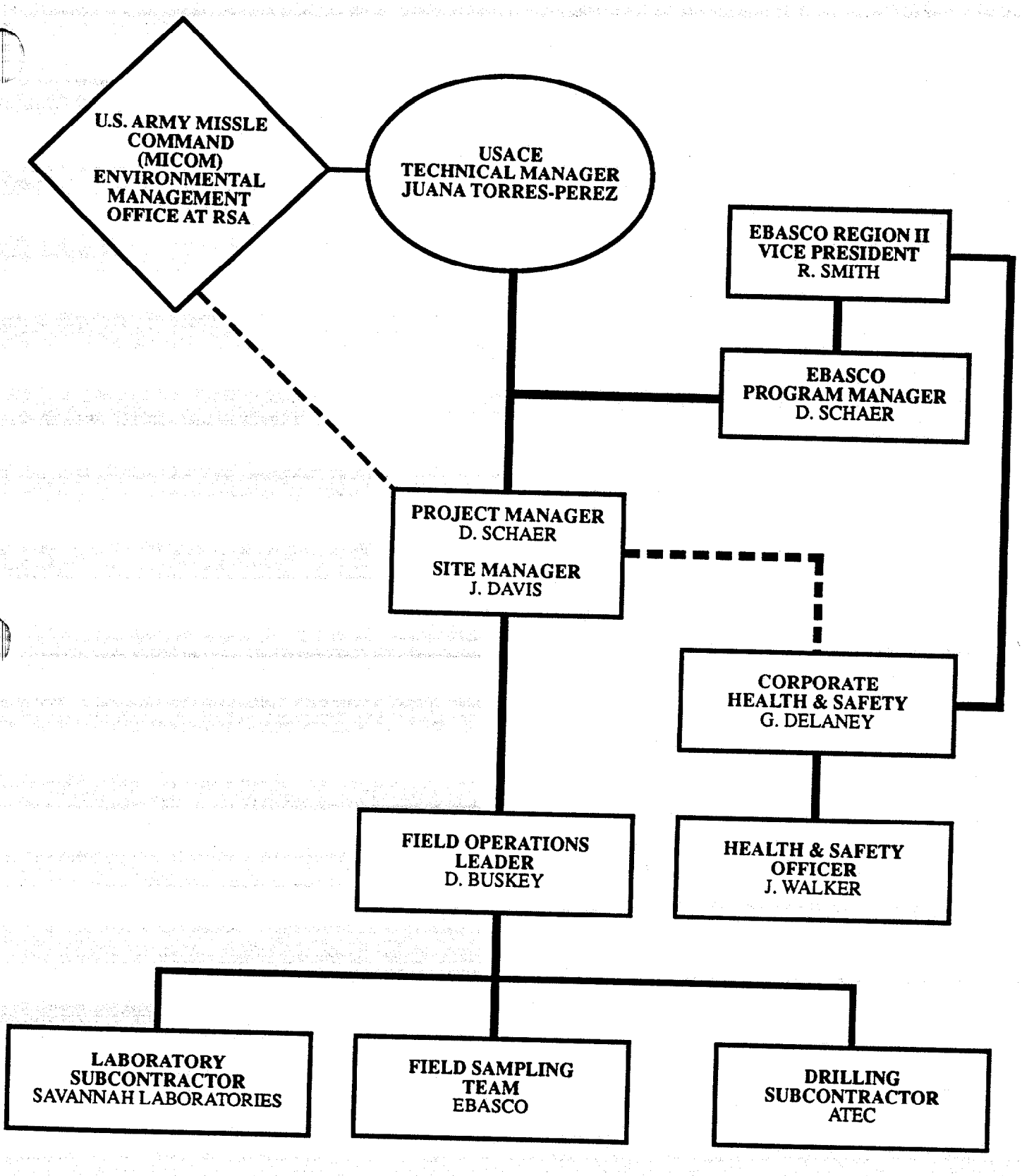
The project organization for the RSA site investigations is shown on Figure 7-1. The Program Manager, Mr. David Schaer, is responsible for the quality of all work performed under USACE Contract DACA 21-91-D-0024. Mr. David Schaer will also serve as the Project Manager (PM). The PM has primary responsibility for implementing and executing the soil and water investigation. The PM is supported by the Site Manager (SM), Mr. Joel Davis; Field Operations Leader (FOL), Mr. DeWayne Buskey; and other technical support staff. The FOL is responsible for the on-site management of activities during the field investigation. All on-site activities will be coordinated with Micom on a daily basis.

The soil and water testing investigation tasks included in this Work Plan, in addition to the schedule and budget, comprise the baseline plans which form an integrated management information system against which work assignment progress can be measured. The baseline plans are a precise description of how the work assignment will be executed. Discussions of the project schedule and budget are presented in Sections 7.5 and 7.6, respectively.

7.2 QUALITY ASSURANCE AND DATA MANAGEMENT

The site-specific quality assurance requirements will be in accordance with ER 1110-1-263, Chemical Data Quality Management for Hazardous Waste Remedial Activities. This document prescribes Chemical Data Quality Management (CDQM) responsibilities and procedures for all chemical contamination investigative activities to assure that the analytical data obtained is of sufficient quality to meet intended usages within the project. In addition, the requirements will be consistent with the memorandum of Minimum Data Reporting Requirements from the Missouri River Division Corps of Engineers dated August 16, 1989.

Data management aspects of the program pertain to controlling and filing documents. Ebasco has developed a program filing system to ensure that the integrity of the documents is safeguarded. This guideline will be implemented to control and file all documents associated with the RSA 99, 117, and 130 soil and groundwater investigations.



EBASCO

PROJECT ORGANIZATION
REDSTONE ARSENAL
RCRA FACILITY INVESTIGATIONS
HUNTSVILLE, ALABAMA

FIGURE 7-1

7.3 ANALYTICAL LABORATORY

Savannah Laboratories is the contractor laboratory that will perform the required analyses. This firm is a full-service facility. Their areas of expertise include analytical chemistry, mass spectrometry, aquatic and terrestrial biology, microbiology, environmental chemistry, and computer science. They are headquartered in Savannah, Georgia with satellite offices in Mobile, Alabama, Tallahassee, Florida and Deerfield Beach, Florida. These laboratories offer the following capabilities.

- Appendix VIII/IX Parameters
- Bioassays and Bioaccumulation Studies
- CLP Protocol and Data Packages
- Coastal Permitting Investigations
- Dioxin/Dibenzofuran Determinations
- Drinking Water Analyses
- Radiochemical Determinations
- Environmental Assessment Analyses
- Field Sampling and Monitoring Analyses
- Groundwater Monitoring Analyses
- Incineration Product and Emission Tests
- Legal Testing and Testimony
- Mass Spectrometry (GC/MS)
- Metals Determinations (AA/ICP)
- Microbiological Testing
- NPDES Waste Water Permit Monitoring
- Occupational Exposure Monitoring
- On-Site Laboratory Testing
- Pesticides/Herbicides/PCBs by GC & HPLC
- Priority Pollutant/HSL/TCL Lists
- TCLP and EP Toxicity Studies
- Tributyltin Determinations
- Underground Storage Tank (UST) Parameters
- Waste Disposal Profiles (Manifests)

Savannah Laboratories' staff of more than 200 employees includes professionals with B.S., M.S., and Ph.D. degrees and extensive experience. Savannah Laboratories' technical consultants supplement in-house capabilities with skills in the fields of marine chemistry, marine biology, ecology, statistics, computer science, and analytical chemistry.

Savannah Laboratories' full service facilities provide more than 50,000 square feet of chemical and biological laboratory, data processing, and office space. These laboratories are custom designed to accommodate modern instrumentation, to minimize employee exposure, and to reduce the potential for sample contamination.

Savannah Laboratories, Savannah, Georgia facility, is currently approved by the Missouri River Division Corps of Engineers Laboratory Certification Program and will perform all sample analyses conducted during this investigation. One or more of Savannah Laboratories' Divisions has received certification, accreditation, approval or a successful on-site blind sample audit from the following agencies:

- Alabama DER
- DOE - HAZWRAP
- EPA Region IV
- EPA Region V
- Florida DER
- Florida HRS
- Georgia EPD
- New York DOH
- North Carolina DEM
- South Carolina DHEC
- Tennessee DOH
- U.S. Navy (NEESA)
- Virginia GSA
- West Virginia DNR
- Wisconsin DNR

7.4 SITE SECURITY AND ACCESS

There are no plans for Ebasco to provide site security. The FOL will have the prime responsibility of providing secure areas for sample, waste, and equipment storage. Authorization for site access will be the responsibility of the U.S. Army Missile Command (MICOM) Environmental Management Office at RSA. Access to the sites and surrounding areas will be via the main entrance roads to the sites.

7.5 PROJECT SCHEDULE

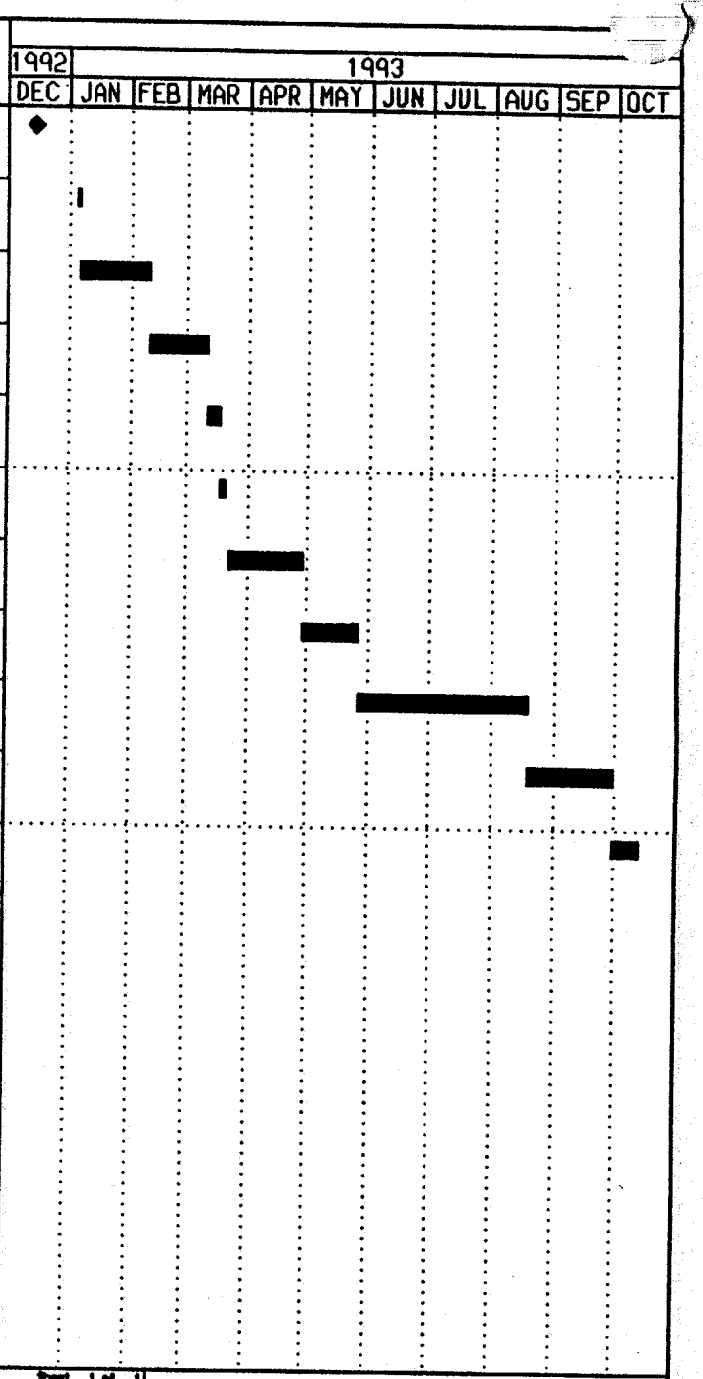
The schedule of tasks and activities for the RSA 99, 117, and 130 sites is presented in Figure 7-2. A 7-month schedule is proposed. The schedule for the field investigation assumes that no site restrictions will be encountered and is dependent upon USACE approval of this Work Plan, as shown in the schedule.

7.6 BUDGET ESTIMATES

A total budget of $347,073 is estimated to perform the soil and groundwater investigation for the three sites.

FIGURE 7-2

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
NTP	15DEC92		0
Prework Conference	5JAN93	5JAN93	1
Draft Work Plans	6JAN93	9FEB93	25
COE Review of Work Plans	10FEB93	10MAR93	21
Final Work Plans	11MAR93	17MAR93	5
Mobilization	18MAR93	19MAR93	2
Field Investigation	22MAR93	28APR93	28
Laboratory Testing	29APR93	26MAY93	20
Draft Engineering Report	27MAY93	18AUG93	60
COE Review of Engineering Report	19AUG93	29SEP93	30
Final Engineering Report	30SEP93	13OCT93	10



Plot Date 26JAN93
Data Date 1DEC92
Project Start 1DEC92
Project Finish 13OCT93

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

Sheet 1 of 1

ACOE/SAVANNAH DISTRICT
RFI for RSA 99, 117, 130
GANTT CHART

Date	Revision	Checked	Approved

8.0 LIST OF REFERENCES

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